Oct. 17, 1961 D. FEROLETO 3,004,449

CAM

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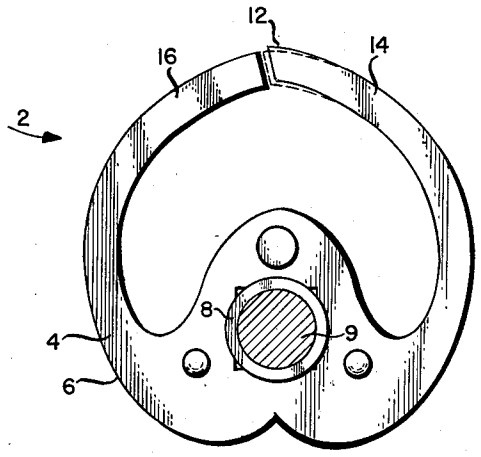


Fig. 1

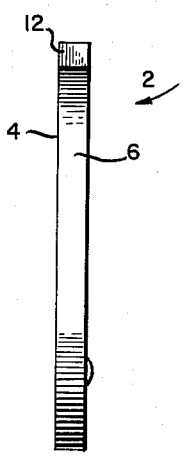


Fig. 2

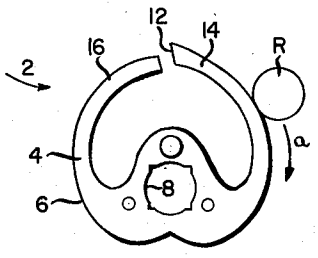


Fig. 3

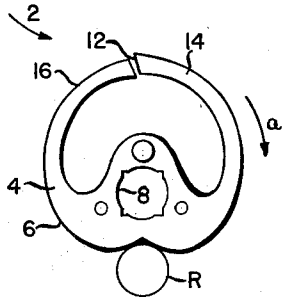


Fig. 4

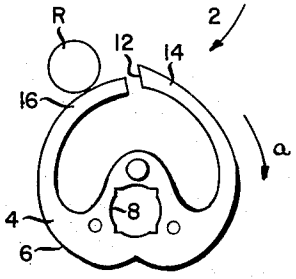


Fig. 5

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3,004,449

CAM

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My invention relates to structural improvements in cam mechanisms for controlling movements of associated instrumentalities or components and is directed more particularly to the provision of a cam having a relatively yieldable portion by means of which the operating surface of the cam may be modified or varied during operational use. That is, the circumferential extent of the dwell is adapted to be varied by the pressure exerted thereupon by a cam-engaging component.

The invention envisions a pointer or hand-setting cam, such as used in timer movements, but is conceivably adapted for use in other control or timer applications. In the case of timer movements, for example, it may be desired to provide a re-setting cam having the function of re-setting the hands of the timer from any position following a timing operation by way of returning the operating shaft of the timer to its starting position from any position to which the shaft has rotated without danger of becoming stalled due to the presence of the usual dead-spot in such mechanisms.

The invention hereof may be advantageously used in connection with such aforesaid purpose but it will be understood, of course, that the invention will find utility in other mechanisms incorporating cam actions or in any device in which it is desired to return an operating shaft to a starting position. The invention however will be described, for illustrative purposes, in connection with a timing device of the re-set type.

As is known, in the prior art of timers of the re-set type, the re-set mechanism may comprise a heart-shaped cam fixed on an operating shaft which actuates a timing pointer. A re-set member, as for example, a pivoted arm, may carry a roller or equivalent device adapted to be moved into engagement with the periphery of the cam upon actuation of the re-set member, it being engageable with said cam periphery at the region of its low point when the shaft is in its starting position. When the shaft has been rotated through a certain angle incident to a timing operation, it may be returned to said starting position by the actuation of the re-set member so as to urge the roller or equivalent device against one or the other of the cam surfaces curving from the high point to the low point of the heart-shaped cam.

In other words, the shaft will be rotated in one direction or the other back to its starting position, depending upon which of these two cam surfaces is opposite the roller or other cam-engaging part of the re-set member when the timing operation has been completed.

The high point of the heart-shaped cam, with such re-set mechanisms, is sometimes directly opposite the cam-engaging part of the re-set member, upon completion of the timing operation, so that when the re-set member is actuated to urge the roller or the like against the cam periphery, this part is centered on the high point or "dead-spot" of the cam, wherefor the pressure of the re-set member cannot turn the operating shaft in either direction. Thus, considerable inconvenience may be experienced in overcoming the stalled condition.

The principal object of the present invention is to provide means for overcoming this "dead-spot" problem by the use of a cam which may be influenced so as to vary its shape as circumstances and necessity dictate.

For purposes of illustration, the cam of the invention

provide a curve or path of heart shape, which is to say that the cam path is a double lobe with its sides defined by symmetrical generally involute-shaped curves.

Stated otherwise, the cam surface defines a curve or path which is in substantially the shape of a curtate cardioid, same being a double lobe with its sides defined by symmetrical, generally involute shaped, curves where the two symmetrical halves intersect with one another at a reentrant angle, or more properly, the curtate portion of the cam curve. From this point of intersection, the two halves extend outwardly around ever increasing radii (much as the usual involute curve) to a common outer end point or nose which forms the salient angle of the cam curve.

The cam is comprised of an integral whole which may be rigidly secured to a cam shaft and which is split transversely of its circumferential periphery adjacent its nose so as to provide a pair of springlike cam segments capable of being flexed as to each other for the function of modifying the configuration of the cam contour.

The cam is mounted upon a camshaft and its configuration is arranged to be modified by virtue of the compressibility of a portion of its own body structure whereby the dwell of the cam may be varied while the device is in operation, thereby providing a simple and easily operated means for insuring against any stoppage due to the cam stalling on a "dead center."

In the actual application herein considered, a driver causes the cam and camshaft with its attached parts to move. The driver moves in a radial direction towards the center of the camshaft. With the cam periphery being split as shown in this disclosure, radial movement of the driver causes the cam to yield sufficiently so that the cam point is moved to one side or the other of the driver so that the rotation or resetting action will readily follow.

In the drawing:

FIG. 1 is a side elevational view of the cam of the invention;

FIG. 2 is an end elevational view of the cam shown in FIG. 1; and

FIGS. 3–5 are small scale views showing the cam of FIG. 1 and a driver in different positions of relationship.

Referring to the drawing, I have therein illustrated a cam constructed in accordance with my invention.

The cam, generally designated by **2**, comprises a body **4** having a cam operating surface **6** generally in the shape of a heart.

The cam is apertured at **8** to permit mounting thereof on a camshaft **9**, as by a press fit or other suitable means.

It will be understood that camshaft **9** is adapted to be rotated in a certain direction by any suitable means and that, when so rotated and then stopped, it may be desired to re-set the shaft to its starting position in preparation for a subsequent operation.

As shown in the drawing, the cam is preferentially constructed in one integral piece to form a substantially heart-shaped operating body which is split transversely as designated by numeral **12** adjacent the point of its nose so that, while a cam surface is provided, the one lobe or cam surface **14** on one side of the cam may be deflected downwardly as a roller or driver R rides thereupon in the direction of the arrow *a*, from the position relative to the roller, as shown in FIGS. 3 or 5, to the position relative to the roller, as shown in FIG. 4, it being understood that in all positions of the cam, the roller is in constant bearing contact with the working surface or periphery of the cam.

Stated otherwise, the said cam lobe **14** on one side of the nose and the cam lobe **16** on the opposite side thereof are arranged as a complementary pair in side-by-side relationship with their free ends, adjacent the transverse

split 12, facing each other and slightly offset as to each other when in their normal operating position.

Roller or driver R will be understood to be urged into contacting engagement with the cam periphery as by means of a solenoid or other physical means (not shown).

The cam lobes are actuated by means of driver R which functions as an actuating member and contacts the cam so that cam lobe 14, being yieldable, is caused to spring or bias inwardly.

The said one cam lobe 14 will be understood to be depressed by the driver R, from the position shown in solid lines to the position shown in dash lines, in FIG. 1, so that no dead center is encountered at the point of the cam, whereupon the driver may be successively and uninterruptedly brought to bear upon the reentrant angle of the cam.

In actual application, the driver causes the cam and cam-shaft to move, the driver moving in a radial direction towards the cam shaft center. The cam being so shaped, a rotational movement is readily imparted thereto by the driver except that, when the cam is so located that the radial action of the driver is directed at the point or nose of the cam, no action is possible except when the cam periphery is split as herein shown so as to allow the radial action of the driver to cause the cam to yield sufficiently or the lobe to bias inwardly sufficiently for the cam point to be moved to one side or the other of the driver whereafter the re-setting action will follow in that the driver is free to continue turning the cam until the cam and its camshaft are returned to starting position.

Certain modifications and alterations in the design of the components of the invention specifically illustrated and described have already been alluded to and others will be apparent to one skilled in the art. For this reason, the scope of the invention is not determined by the illustrative embodiment but rather by the hereunto appended claim.

Having thus described the invention, that which is claimed is:

In a timer device incorporating an operating shaft, a resetting cam mechanism coacting with a driver for rotating the operating shaft of the timer device to a predetermined position preparatory to subsequent rotation comprising, a cam mounted on the operating shaft and having an outer circumferential periphery provided with high and low points located respectively at a maximum and minimum radial distance from the rotation axis of the operating shaft, the outer periphery of said cam also having a pair of curved surfaces interconnecting the high and low points and each extending at a progressively increasing radius from the axis of the operating shaft as the surface curves from the low point to the high point, said cam having a radial split transversely of and inwardly of one of the curved surfaces of the pair thereof immediately adjacent the high point and providing a pair of oppositely-facing free-ended lobes, the free end of one of the lobes of the pair thereof having an outer curved surface offset radially outwardly from the outer curved surface of the free end of the other of the lobes of the pair thereof and being biasable inwardly as the pressure of the driver is exerted thereagainst whereby said cam and the operating shaft are returnably-rotatable in reset manner to the predetermined position from any position of the operating shaft.

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